

CHEM 112.3: General Chemistry 1

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Textbook: *Chemistry*, 2019, 6th Edition, by Gilbert et al.

Chapter 3: Stoichiometry: Mass, Formula, and Reactions

Chemical Reactions

- *Combination reaction* – two (or more) substances combine to form one product



Chemical equations:

- Describe proportions of reactants and products during a chemical reaction
- Reactants - the substances that are consumed during a chemical reaction
- Products - the substances that are formed during a chemical reaction
- Describe the changes on the atomic level:
 - $\text{SO}_3(g) + \text{H}_2\text{O}(l) \rightarrow \text{H}_2\text{SO}_4(l)$
 - $\text{Fe}_2\text{O}_3(s) + 3 \text{H}_2\text{SO}_4(aq) \rightarrow 3 \text{H}_2\text{O}(l) + \text{Fe}_2(\text{SO}_4)_3(aq)$
- Physical state of products/reactants:
 - (s) = solid, (l) = liquid, (g) = gas; (aq) = aqueous solution

The Mole

- A mole is a unit for a specific quantity of a substance.
- 1 dozen = 12 items
- 1 gross = 144 items
- 1 mole = 6.022×10^{23} particles (also known as Avogadro's number)
- A mole is Avogadro's number of atoms in exactly 12 grams of carbon-12.
- Unit for expressing macroscopic quantities (atoms or molecules) involved in chemical reactions
- To convert between number of particles and an equivalent number of moles:

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